Error dynamics in a coastal configuration of NEMO using stochastic modeling: first steps towards Data Assimilation in the Bay of Biscay

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At present, several high-resolution models are widely used in coastal ocean configuration with prediction purposes. In this context the choice of the ad hoc data assimilation (DA) method, that will ensure the "best" estimate of the ocean state through a combination of model forecast and observations, is decisive and it needs to be assessed on a case-by-case basis.

The design of a DA system, based on the Ensemble Kalman Filter and the ocean model NEMO, is currently involving the french research teams of MERCATOR-OCEAN and of LEGOS (CNRS, Toulouse), within the MyOcean project. As a key step towards DA, we present sensitive experiments devoted to the evaluation of the model errors and their dynamic, primarily due to the uncertainties in the atmospheric forcing.

More particularly, the ensemble experiments are carried out in the ocean model NEMO, in its coastal configuration in the Bay of Biscay, and they are performed within a winter period ranging from 01.12.2007 to 29.02.2008 (initial conditions are provided at 01.12.2007 by a longer reference run). For each member of the ensemble and every five days of integration of the ocean model, a perturbed wind anomaly, composed by a linear combination of five random normally distributed values and five temporal and spatial EOFs, is added to the unperturbed wind. As the result of such experiences the errors evolution is depicted by the analysis of high-order statistical moments as well as the computation of the error covariance and the representers.

Comparisons to other stochastic modeling experiments (by LEGOS/CNRS, PREVIMER/IFREMER) are carried out with the aim to better understand the observed error subspace structures and with the common objective of accompany the development of operational oceanography in coastal areas and more specifically in the Bay of Biscay.